Math 113 Review for Test 1

Functions
- Know how to find the natural domain.
- Know how to find compositions of given functions.
- Know how to show that two function are inverses of each other.

Problems: p13#11ab; p62 #1c; p97 #15

Exponential and Logarithmic Functions
- Know how to find exponentials and logs.
- Know the laws of exponents and logs.

Problems: p74#9b,15

Trig Functions
- Know radian versus degree measure.
- Know the definitions of \( \sin \theta \) and \( \cos \theta \) using the unit circle.
- Know the definitions of the other trig functions.
- Know the trig function for the familiar angles (0, \( \pi/6 \), \( \pi/4 \), \( \pi/3 \), \( \pi/2 \), etc.).
- Know the definitions of \( \sin^{-1}x \) and \( \tan^{-1}x \).

Problems: pA11#5b,15d; p62#4abc(Quick Check),41a

Limits and Continuity
- Know how to find limit from the graph of a function.
- Know how to compute limits using properties.
- Know how to find discontinuities and determine continuity on an interval.

Problems: p162#1,5-9,31,33

Derivatives
- Know how to state and use the definition of the derivative.
- Know how to use the derivative rules.
- Know how to do implicit differentiation.

Problems: p233#15b; p265#1,3,9,23,27,31,33

Applications of the Derivative
- Know how to do related rates problems.
- Know how to write an equation of the tangent line to \( y = f(x) \) at a point.
- Know how to find the intervals on which a function is increasing/decreasing.
- Know how to find critical numbers and relative extrema.
- Know how to determine concavity and inflection points.

Problems: Related rates problems assigned in class; p345#3,5,7,25a,27a

Proofs to Know
1. If \( f \) is differentiable at \( x = c \), then \( f \) is continuous at \( x = c \).
2. Know how to prove \( \lim_{h \to 0} \frac{\sin h}{h} = 1 \) and \( \lim_{h \to 0} \frac{\cos h - 1}{h} = 0 \).

Study class notes, homework, and quizzes